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DECIMAL COINAGE

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DECIMALS

AND

DECIMAL COINAGE.

WITH

EASY RULES FOR DECIMAL CALCULATION,
AND A FULL EXPLANATION OF THE
PROPOSED NEW COINAGE.

BY

COLLINGWOOD COOPER.

London:
PUBLISHED BY SIMPKIN AND MARSHALL,
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PREFACE.

The necessity of an alteration in our present system of calculating by pounds, shillings and pence has long been apparent, and deputations from every mercantile body in the kingdom have unceasingly endeavoured to impress the fact upon the Government; but it was not until the beginning of the present year that they thought proper to take the matter into serious consideration, and in March a committee was appointed for the purpose of reporting to the House of Commons the practicability and advantages that would arise from adopting a *Decimal system of Coinage.*

That report is now before the public, and it would appear from the evidence of the many eminent men whose opinions were taken on the subject, that a system of decimal coinage in this country is not only advisable, but has become a matter of positive necessity. They point to the fact that most of the continental nations have adopted this system, and are fully impressed with the advantages arising from it. It prevails also in China, Japan, the United States, Brazils, &c., and only needs the example of England to become universal. Of course, in advocating so vast a change in our monetary system, it is but natural that opinions should vary as to the best means of carrying out that system, and accordingly, we find much contradictory evidence given, and difficulties raised, where none exist; and one gentleman (Mr. Headlam, M.P.), although an advocate for the system, considers it altogether impracticable. That there are obstacles in the way there can be no doubt; but we do not consider them of such a nature as to prevent altogether the introduction of a system so necessary to the commercial world. On the contrary, we see none but what time may soften, and ultimately remove. The most important are, the necessity for withdrawing from circulation so large a quantity of silver and copper coins, to be replaced by new ones; and the fact that no coin under the sixpence, in the new system, will represent the exact value of those at present in circulation; thus involving the necessity of an alteration in the Penny Postage and Stamp Acts, and an adjustment of the charges arising from turnpikes, bridge-tolls, and other trusts which are established by Act of Parliament at a fixed rate. These ~e the only objections that we think it at all necessary to take any notice of, and it must be confessed they require very serious consideration. With respect to the first difficulty we have mentioned, it appears from the evidence of Sir John Herschel, the present Master of the Royal Mint, that the whole amount of British silver in circulation in Great Britain and the Colonies is about £13,000,000 sterling, or about 236,000,000 pieces of all denominations, nearly the whole of which would have to be ultimately withdrawn and re-coined. This amount of silver is comprised as follows:

3,000,000	three-pences,
18,000,000	four-pences,
67,000,000	six-pences,
37,000,000	half-crowns,
2,000,000	florins,

and the remaining 109,000,000 are made up of shillings and crowns; and as there are a very few of the latter coins, we may safely calculate at least 100,000,000 of this quantity are shillings. The total quantity of copper in circulation is about 5,000 tons, and may be reckoned at 270,000,000 pieces, the *whole* of which, without any exception, would have to be replaced by new coins of different denominations, and representing different values to the old coins. We have therefore a grand total of 506,000,000 pieces, which would require to be withdrawn, exclusive of gold, coins, which will increase the quantity to 700,000,000 pieces. Sir John Herschel then continues to say, "that under the present demand for silver coin, the withdrawal of any large portion from the circulation is hardly possible ; and so long as the demand for gold continues on its present scale, it would be impracticable to pour such a quantity of the new silver into the circulation as to admit of an extensive garbling and re-melting of the old, and such an operation, if commenced in quieter times, might at any moment be seriously disturbed and deranged in its execution, by the arrival of a large and prolonged demand for gold, such as the experience of the last year has shown to be possible."

It is evident from these remarks that the introduction of the new coins must be gradual, and that the interval of notice after the Act has received its final legislative sanction, should be sufficiently long to enable the public to become familiar with them before it became compulsory to keep accounts on the new system ; therefore the *immediate* introduction of some portion of the new coinage is earnestly recommended; and as the way is already paved by the present circulation of the *florin*, experience naturally points to the next coin in the proposed new decimal scale, viz., the 10 *mil*, or *cent piece*, as the one most important to facilitate the carrying out of the project. The new copper money might then be introduced, and for some time would necessarily have to circulate concurrently with the old, which could then be gradually called in in such quantities as circumstances might dictate.

With respect to the second difficulty, it is evident that an alteration in the Penny Postage and the Stamp Acts would be unavoidable; and the question therefore is, whether 4 mils, or 5 mils, shall in future be the rate for postage and receipts. If the former, the Government will be the losers of 4 per cent; and in the latter case, the public will be the losers of 20 per cent. Either alternative is bad, and it will be for the Government to consider which will be attended with the least disadvantage. In cases where private interests are concerned, such as tolls levied under the authority of any Act of Parliament, or other authority having the force of law, and limited in amount thereby, it will be necessary to make such an arrangement that such interests may not be deteriorated in value by the introduction of a new system of coinage, involving the necessity of an alteration in the amount of such tolls. To meet this difficulty it is proposed, that an increased charge of 1 mil be allowed for such a number of years as will be sufficient to create a fund, the interest arising from which will cover the loss which will accrue from the small difference between the values of the old and new coins. Thus, taking Hungerford Bridge as an example, it is proposed that the shareholders shall be empowered to levy a rate of 3 mils instead of the halfpenny as at present, for a certain number of years, the interest of which increase, being funded, would be sufficient to pay the loss between the value of the 2 mil price and the present halfpenny, which loss would be 4 per cent. on the amount of their receipts, when the rate is reduced to 2 mils. This appears the only feasible plan, although it will be a matter for Government to consider, should any more advantageous plan present itself.

The Press having from time to time adverted to this matter, much that we have said has already been made public. It has consequently largely engrossed the public mind, and, although an opinion seems to prevail that great confusion will ensue from the necessity of altering our mode of keeping accounts, as from long habit the mind has necessarily become associated with the old system, yet from what we have been able to learn, no uneasiness appears to exist with respect to an ultimate good result. We have noticed, however, one circumstance, that many persons, supposed to have received a tolerably good education, have no idea whatever of decimals. They appear to have a difficulty in conceiving a decimal fraction. A fraction to be understood must be expressed in the ordinary way. This ignorance of one of the common principles of arithmetic, and which we are persuaded pervades a very large class, is mainly to be attributed to the paucity of education considered necessary in second and third class schools, twenty and five-and-twenty years ago. A boy was considered far enough advanced if he got as far as vulgar fractions. He was then launched into the busy world, and would have little opportunity of learning the nature of decimals, unless thrown into a commercial sphere where the relations with foreign countries in which the decimal system existed, would render it imperative on him to extend his knowledge so far. There is also another point which must not be lost sight of; it is, the scarcity of information to be obtained respecting decimals. We are not aware of any work in existence which treats of this subject solely; and in the ordinary school books a very small share of attention is paid to it. No doubt there are works where the matter is treated of incidentally, but these works are not available to the general public. It was, therefore, with these facts in mind, that the present short treatise was compiled. We have endeavoured to place before the public, in a simple and concise form, the mode of calculating by decimals, and more especially as applied to the proposed new coinage. The simplest examples have been selected and fully explained, and the nature and value of each new coin described. With these few remarks we conclude, confidently hoping that we shall have succeeded in our object.

Barrington Road, Brixton.

SECTION I.

THE fundamental principle of decimals consists in rendering the value of a figure ten times greater by every removal of place toward the left hand, and consequently, also, ten times less by every removal toward the right. Thus, in proceeding from the right hand toward the left, we pass from units to tens, from tens to hundreds, from hundreds to thousands, and so on; and, reversing this order, we pass, for example, from thousands to hundreds, from hundreds to tens, and from tens to units. We find this difference, however, that whereas in the one case we can advance as far as we please, in the other our progress is limited. But in proceeding toward the right hand, it may be asked, must we necessarily stop at unity? As 1 is the tenth part of 10, may we not conceive a fractionary unit, which in like manner shall be the tenth part of an integral unit? Nothing prevents us from pursuing the analogy still further, and descending by tenths, as we ascended by tens. We shall thus have tenths, hundredths, thousandths, &c., by removing them toward the right.

In order to render the notation complete, we have only to adopt some method of distinguishing the fractions from the whole numbers, since they are both expressed by the same characters, and we have no means of knowing where they begin and end respectively. For this purpose we make use of a dot, which is sufficiently convenient for the purpose, and accordingly it is usually employed thus, $2\frac{1}{10}$ is written 2.1; $2\frac{1}{100}$, 2.01; $2\frac{1}{1000}$, 2.001, &c. The figures on the right hand of the dot are called *decimal fractions*, or simply decimals, and the dot itself is called the *decimal point.*

The numeration of decimal fractions does not differ essentially from that of integers; thus .4 is read four tenths; .04, four hundredths; the value of a figure being diminished ten times by each removal of place toward the right hand. The interposition of cyphers between the decimal point and the significant figures of a decimal *diminishes* their value, in the same way as the annexing of cyphers on the right hand side of integers *increases* their value. But the value of a decimal is not affected by writing cyphers on the right hand of its significant figures, thus, .15, .150, .1500, .15000, are all of the same value.

From this short view of the notation of decimal fractions, it is evident that their operation must be subject to the same rules with those of integers. It is in this that consists their greatest excellence, as from the uniformity which they give to calculation, fractional numbers can be pursued to any degree of exactness.

Having given an account of the system of decimal notation, and described their relative value according to their places, we will now proceed to their application in the following order:—

1st. Reduction of Vulgar Fractions to Decimals, and Decimals to Vulgar Fractions.
2nd. Addition of Decimals.
3rd. Subtraction of Decimals.
4th. Multiplication of Decimals.
5th. Division of Decimals.
6th. Scale of Decimal Currency — its explanation and various examples descriptive of its application to commerce.

SECTION II.

REDUCTION OF VULGAR FRACTIONS TO DECIMALS, AND DECIMALS TO VULGAR FRACTIONS.

Problem 1st.—To reduce a vulgar fraction to a decimal.

Rule.—Divide the numerator of the given fraction with an indefinite number of cyphers annexed by the denominator; the quotient will express the decimal sought, and the number of cyphers annexed will shew the number of decimal places.

Example 1.—Reduce $\frac{1}{2}$ to a decimal.

2)10(.5
10

We divide the numerator 1 by the denominator 2, and as 2 will not involve into 1, we add a cypher making it 10. The quotient is then 5, and we place the decimal point immediately before the 5, because the decimal sought must consist of one figure, one cypher having been annexed to enable us to proceed with the division.

Example 2.—Reduce $\frac{39}{960}$ to a decimal.

960)3900(.040625
3840

6000
5760

2400
1920

4800
4800

As two cyphers have been annexed to the numerator 39, to obtain the first figure in the quotient that figure must be two places from the decimal point. The subsequent part of the operation is the same as common division, the figures of the dividend being supposed to consist entirely of cyphers.

Example 3.—Reduce $\frac{1}{8}$ to a decimal.

```
8)10(.125
  8
  ——
  20
  16
  ——
   40
   40
   ——
```

In the three preceding examples the fractions $\frac{1}{2}$, $\frac{39}{900}$, and $\frac{1}{8}$, have been reduced to decimals with perfect exactness, and without having any remainder; but it sometimes happens, that the corresponding decimals of vulgar fractions cannot be found, and that the division, though pursued to any length, does not come to an end. Hence we obtain two great classes of decimals; the former being said to be *terminate*, or *finite*; and the latter to be *interminate*, or *infinite*.

The value of an infinite decimal, from its very nature, cannot be assigned by any limited number of figures; but, in general, we perceive some peculiarity in the quotient, which enables us to treat it in the same manner as if it were really finite, and leads with equal certainty to the result in the various operations to which it may be subjected. But with infinite decimals it frequently happens that we find a constant recurrence of one figure, and of two or more figures. Thus $\frac{1}{3}$ reduced to a decimal gives a continual recurrence of the same figure 3; and $\frac{25}{99}$ of two figures, viz., 25, &c. When the same figure is constantly repeated, it is called a *repeating* decimal, and when two or more figures return in regular succession, they are called a *circulating* decimal. If repeaters or circulates begin immediately after the decimal point, they are called ***pure repeaters*** and ***pure circulates***, but if other figures intervene between them and the decimal point, they are called ***mixed repeaters*** and ***mixed circulates***. We have thought it necessary to give this explanation of the variety of decimals which occur in practice, and whose operations are somewhat different to finite decimals, because it would have been impossible in any treatise on this subject to have passed them by without mention, although in ordinary commercial transactions, they rarely, if ever, occur; and when they do, are mostly treated as finite decimals, the difference between the two modes of calculation being so trifling as not to be worth notice. We give an example or two shewing their nature.

EXAMPLE 1.—Reduce $\frac{1}{3}$ to a decimal.

```
3)10(.3333
   9
  ---
   10
    9
   ---
    10
     9
    ---
     10
      9
     ---
      1
```

To produce one figure in the quotient in the above example, we are obliged to add one cypher to the dividend. The quotient therefore has one decimal place, and we place the decimal point immediately before the 3. We then proceed with the division, and find a constantly recurring remainder of 1 in the dividend, which produces a constant repetition of the figure 3 in the quotient. This is called a *repeating* decimal.

Example 2.—Reduce $\frac{1}{960}$ to a decimal.

```
960)1000(.00104166
     960
    ─────
     4000
     3840
     ─────
      1600
       960
      ─────
       6400
       5760
       ─────
        6400
        5760
        ─────
         640
```

In this example we are obliged to add three cyphers to the dividend to produce one figure in the quotient. We must therefore have three decimal places in the quotient, and as we have only one at present, we complete the fraction by prefixing two cyphers. We then proceed with the division in the usual manner, annexing cyphers to the dividend, until we have a remainder which produces a constantly recurring figure in the quotient. This is a *mixed repeating* decimal, because the repeating figure does not occur immediately after the decimal point.

EXAMPLE 3.—Reduce $\frac{25}{99}$ to a decimal.

```
99)250(.25,25,25
   198
   ----
    520
    495
    ----
     250
     198
     ----
      520
      495
      ----
       250
       198
       ----
        520
        495
        ----
         25
```

This is a *circulating* decimal, because there is a continual recurrence of the same figures, 2 and 5.

Example 4.—Reduce $\frac{5569}{99000}$ to a decimal.

99000)556900(.056,25,25
495000

619000
594000

250000
198000

520000
495000

250000
198000

520000
495000

25000

The above is an example of a *mixed circulating* decimal, as the two recurring figures, 2 and 5, do not present themselves immediately after the decimal point.

Problem 2.—To reduce a decimal to the form of a vulgar fraction.

Rule.—Write the given decimal as the numerator, and unity with as many cyphers annexed to it as the decimal has places for the denominator.

Example 1.—Reduce .825 to a vulgar fraction.

$.825 = \frac{825}{1000}$ or $\frac{33}{40}$

Example 2.—Reduce 03125 to a vulgar fraction.

$03125 = \frac{3125}{100000}$ or $\frac{1}{32}$

SECTION III.

ADDITION OF DECIMALS.

Rule.—Place the given decimals in such a manner that tenths may be under tenths, hundredths under hundreths, &c., and then proceed as in the addition of integers. The carriage arising from the tenths is carried to the unit place of integers.

Example 1.—Add together .75, .832, and .056.

$$\begin{array}{r} .75 \\ .832 \\ .056 \\ \hline 1.638 \end{array}$$

Example 2.—Add together 6.002, .005, 5.12, and .285.

$$\begin{array}{r} 6.002 \\ .005 \\ 5.12 \\ .285 \\ \hline 11.412 \end{array}$$

SECTION IV.

SUBTRACTION OF DECIMALS.

Rule.—Place tenths under tenths, hundredths under hundredths, &c., and if the mineund has fewer decimal places than the subtrahend, conceive the deficiency to be supplied with cyphers; after which proceed as in the subtraction of integers.

Example 1.—Subtract .18 from .468.

$$\begin{array}{r@{}l} & .468 \\ & .18 \\ \hline & .288 \end{array}$$

Example 2.—Subtract .4327 from .75.

$$\begin{array}{r@{}l} & .75 \\ & .4327 \\ \hline & .3173 \end{array}$$

Example 3.—Subtract 2.016 from 8.654.

$$\begin{array}{r@{}l} 8 & .654 \\ 2 & .016 \\ \hline 6 & .638 \end{array}$$

Example 4.—Subtract .00162 from 4.6.

$$\begin{array}{r@{}l} 4 & .6 \\ & .00162 \\ \hline 4 & .59838 \end{array}$$

SECTION V.

MULTIPLICATION OF DECIMALS.

Rule.—Proceed as in the multiplication of integers, allowing as many decimal places to the product as there are in *both* factors together; and if the product does not consist of so many figures, supply the defect by prefixing cyphers on the left hand.

EXAMPLE 1.—Multiply .16 by .14.

$$\begin{array}{r} .16 \\ .14 \\ \hline 64 \\ 16 \\ \hline .0224 \end{array}$$

As both factors together in this example consist of 4 decimal places, the defect of the product, which consists only of 3, is supplied by prefixing a cypher on the left hand.

EXAMPLE 2.—Multiply .72 by .23.

$$\begin{array}{r} .72 \\ .23 \\ \hline 216 \\ 144 \\ \hline .1656 \\ \hline \end{array}$$

Example 3.—Multiply 1.086 by .25

$$\begin{array}{r} 1.086 \\ .25 \\ \hline 5430 \\ 2172 \\ \hline .27150 \end{array}$$

SECTION VI.

DIVISION OF DECIMALS.

Rule.—Divide exactly in the same manner as if the given decimals were integers, and the number of decimal places in the quotient will be equal to the excess of the decimal places of the dividend above those of the divisor. But if the decimal places of the divisor exceed those of the dividend, the deficiency must be supplied with cyphers, and the quotient will then be integers.

Example.—Divide .75 by .5.

$$\begin{array}{r} .5).75(1.5 \\ 5 \\ \hline 25 \\ 25 \\ \hline \end{array}$$

In this case the excess of the decimal places in the dividend over those of the divisor is 1. Therefore, from the quotient, 15, we cut off one decimal place, which makes it 1.5.

Example 2.—Divide .185 by 2.5.

```
2.5).185(.074
     175
     ---
      100
      100
      ---
```

Here the excess is two decimal places, consequently, before proceeding in the division with the remainder, 10, we must have two decimal places in the quotient, and as at present there is only one, we supply the deficiency by prefixing a cypher.

Example 3.—Divide .25 by .05

```
.05).25(5
     25
     --
```

In this example the number of decimal places in the divisor and dividend are equal; therefore, as there are no decimal places to cut off, the quotient is an integer.

Example 4.—Divide .15 by .125.

```
.125).150(1.2
      125
      ---
       250
       250
       ---
```

In this example the addition of the cypher to the dividend does not increase or diminish its value, as we have previously pointed out. We have then the same number of decimal places in the divisor, and dividend, and therefore the first figure in the quotient is an integer. The division then proceeds, and the subsequent figure is a decimal.

SECTION VII.

The first point for consideration in forming a scale for decimal coinage, is to fix the *unit*, and then descend decimally to the lowest fractional part of that unit. Thus, supposing the present £1 sterling be fixed as the unit, we commence by taking a tenth part of that coin, then a hundredth, and finally a thousandth part, viz.:—

1.000 mils, or one Pound.
100 mils, or one Florin.
10 mils, or one Cent.
1 mil.

Here, then, we have a scale complete in itself, and for the purposes of accounts, requiring nothing further. For the convenience of commerce, however, it is requisite to have a coin to represent each gradation, and also for further convenience in exchanges, intermediate coins of various values. These coins, as proposed by the Committee of the House of Commons, we have described and commented upon in another place.

Several plans have been proposed, giving different units as a starting point, and having each their advantages; but it has been considered by almost all the witnesses examined before the Committee, and who must necessarily have made themselves masters of this subject, that any departure from our present £1, as the unit in any decimal scale to be introduced into this country, would create great confusion, and, in fact, render it almost impracticable to carry out the system. The £1 sterling is so ingrafted in our ideas as the standard of value, that any interference respecting it would create great prejudice in the minds of every one. Every monetary association is connected with the £1. The National Debt, the rental of houses, land, and, in fact, every description of what is called property, is estimated by the £1 sterling. Besides, the adoption of any unit of less value, except the half sovereign, would involve the necessity of a *silver monetary standard*, and we are essentially bound to a gold one. Were it, however, possible to do away with the £1 as the unit, our sympathies would be wedded to what Sir John Herschel calls the "Ducat" scale; taking the present half-sovereign as the unit. We should thereby retain the shilling as a standard coin, and it would admit of a copper coin to represent its tenth part, besides which, less intermediate coins would be necessary.

With these few remarks which we have thought it necessary to make, we now proceed to consider the new scale of coinage as recommended for adoption by the select Committee of the House of Commons. It is as follows:—

New Currency.			Present Currency.		
1.000	mil piece,	equiv. to	£1	0	0
100	ditto	equiv. to		2	0
10	ditto	equiv. to		.	$2\frac{2}{5}$
1	ditto	equiv. to			$\frac{6}{25}$

It will be observed that we have designated the new coinage as *mil pieces*, as we have not been able to ascertain the names positively to be assigned to each new coin; although, we have little doubt, that according to the suggestions given to the Committee, the above four pieces will be called respectively *Pounds*, *Florins*, *Cents* and *Mils*. These coins will then represent the decimal scale to be used for *accounts*, in addition to which the following coins are to be introduced, being those best adapted for practical use, viz.:—

500	mil piece,	gold,	equivalent to	£0	10	0
250	ditto	silver,	ditto	0	5	0
50	ditto	ditto	ditto	0	1	0
20	ditto	ditto	ditto	0	0	$4\frac{4}{5}$
5	ditto	copper,	ditto	0	0	$1\frac{1}{5}$
2	ditto	ditto	ditto	0	0	$0\frac{12}{25}$

It will thus appear from the foregoing statement, that the five first coins are equivalent in value to the following at present in circulation, viz., the £1, 10s., 5s., 2s., and 1s. pieces, and there will therefore be little difficulty in substituting the new coinage under a new denomination.

The half-crown, sixpence, four-penny piece, three-penny piece, penny, half-penny and farthing will have no equivalent representative in the new scale, as being (with the exception of the half-crown and sixpence) inconsistent with the decimal scale, and will therefore be withdrawn from circulation.

The 1 *mil* piece is 4 per cent. *less* in value than the present farthing, and will therefore be its nearest equivalent; whilst the *5 mil* piece will replace the penny, being, however, 20 per cent. *more* in value; and, although not approximating so close to the penny as a 4 mil piece would have done, it has been considered as possessing greater advantages, both decimally and practically. It was, however, a question, and we believe is considered so now, whether the 4 mil piece would not be more convenient, as being only 4 per cent. less in value than the penny, it would better facilitate the adjustment of the many interests of which that coin is the representative; besides which, it would have the advantage of being more convenient in point of size. On the other hand, the 5 mil piece is undoubtedly decimally superior, and most essential as being an aliquot part of all the higher denominations; for instance, two of them will go to the 10 *mil piece* or *cent*, and ten to the 50 *mil piece*, an advantage in changing and counting large sums which the 4 mil piece does not present, as in changing a 10 *mil* piece or *cent* it would be necessary to give two 4 mil pieces and one 2 mil piece, thus giving a great increase of trouble, which would be severely felt by bankers and others having large sums passing through their hands. This is so important a point as quite to counterbalance its disadvantages, and more especially as the penny, we imagine, could be as well represented by two 2 mil pieces as one 4 mil piece. Mr. De Morgan and others propose the introduction of *both* coins, but we must confess we cannot see the necessity of this, as it must be evident that the less new coins there are the greater the simplicity, and, consequently, the less confusion.

With the exception of the 10 *mil* piece and the 20 *mil* piece, the other new coins require no comment, because, being equivalent to others at present in use, they will readily be understood. The 10 *mil* piece is an important coin, as it forms the third round in the decimal ladder, and will therefore be more before the eyes of the public than those coins which only serve as a means of exchange. Its value with respect to the present money is 2⅖d., within a fraction of 2½d. It will be of silver, and rather less in size than the present threepenny piece, which, however, is an objection, as that coin is already too small. Various suggestions have been made to remedy this difficulty, such as making the coin with a copper rim, or with a hole in the centre. All, however, have been found more or less objectionable, and we believe that the small silver coin has been finally decided on.

The 20 *mil* piece approaches nearest in value to the present sixpence. Its relative value is 4⅘d., and five of them will go to the 100 *mil* piece, or florin.

For convenience of reference, we here give a table

[illegible]

DECIMAL [illegible]

[illegible]

[illegible]

PUBLISHED BY [illegible]

232 [illegible]

showing the value in mils, and fractions of mils, of the present money, from a farthing to a shilling.

TABLE

Showing the equivalent in mils, and fractions of mils, of any sum from a farthing to a shilling.

PENCE.	£ F.C.M.	PENCE.	£ F.C.M.
¼	.001,04166	6¼	.026,04166
½	.002,08333	6½	.027,08333
¾	.003,12500	6¾	.028,12500
1	.004,16666	7	.029,16666
1¼	.005,20833	7¼	.030,20833
1½	.006,25000	7½	.031,25000
1¾	.007,29166	7¾	.032,29166
2	.008,33333	8	.033,33333
2¼	.009,37500	8¼	.034,37500
2½	.010,41666	8½	.035,41666
2¾	.011,45833	8¾	.036,45833
3	.012,50000	9	.037,50000
3¼	.013,54166	9¼	.038,54166
3½	.014,58333	9½	.039,58333
3¾	.015,62500	9¾	.040,62500
4	.016,66666	10	.041,66666
4¼	.017,70833	10¼	.042,70833
4½	.018,75000	10½	.043,75000
4¾	.019,79166	10¾	.044,79166
5	.020,83333	11	.045,83333
5¼	.021,87500	11¼	.046,87500
5½	.022,91666	11½	.047,91666
5¾	.023,95833	11¾	.048,95833
6	.025,00000	12	.050,00000

Having now considered and explained the nature and value of each new coin, we shall give a few examples explanatory of their application to commerce. For this purpose we have assumed a few items as would be entered in an ordinary day-book, or journal, and have worked out each item in a separate example; and for convenience of reference to such example, we have numbered the items to correspond with the examples.

It has been before stated that no final decision has been come to respecting the name each new coin is to bear. We have, however, assumed in the following examples such designations as we imagine will be ultimately assigned them, viz:

1.000	Pound
500	½ Pound
250	¼ Pound
100	Florin
50	½ Florin
20	2 Cents
10	Cent
5	mils
2	mils
1	mil.

January, 1853.

Ex.	JAMES WILSON.		£	F.	C.	M.
1	26 yds. Satin . . . . . . p. yd.	.224	5	8	2	4
2	34½ yds. Broad Cloth . p. yd.	1.050	36	2	2	5
3	63 yds. Doeskin . . . . p. yd.	.322	20	2	8	6
4	44¾ yds. Fancy Doeskin p. yd.	.250	11	1	8	7
			73	5	2	2
	Dedt. Dis. for Cash 2½ p.ct.		1	8	3	8
5		£	71	6	8	4

Ex.			£	F.	C.	M.
	Thompson & Co.					
6	1 chest contg. 1 cwt. 2qr. 12lb.					
	1 do. . . . . - . 1 cwt. 3qr. 20lb.					
	1 do. . . . . . 1 cwt. 1qr. 10lb.					
	4 cwt. 3qr. 14lb.					
	Tea at pr. lb.	.225	122	8	5	0
7	1 cask contg. 6 cwt. 3qrs. 15lb.					
	Sugar at pr. cwt.	2.250	15	4	8	8
			138	3	3	8
8	Disct. for Cash 1¼ pr. cent.		1	7	2	9
		£	136	6	0	9
	Richard Campbell.					
9	16lbs. 13oz. 12drs. Mace, pr. lb.	.172	2	8	9	9
10	15tons 17cwt. 3qrs. 13lbs. Gum					
	Arabic .... per cwt.	3.750	1191	9	9	6
11	108lb. 13oz. 15dr. Nutmegs, p. lb.	.056	6	0	9	6
			1200	9	9	1
12	Discount 3 per cent.		36	0	2	9
		£	1164	9	6	2
	William Edwards & Co.					
13	3cwt. 1qr. 5lbs. Cotton, per lb.	.025	9	2	2	5
14	2cwt. 3qr. 9lbs. ditto, per lb.	.0255	8	0	8	3
15	3cwt. 2qr. 10lbs. ditto, per lb.	.030	12	0	6	0
			29	3	6	8
	Edward Johnson.					
16	26 doz. fancy Hndkrfs. p. doz.	3.050	79	3	0	0
17	12 doz. Linen Collars, p. doz.	.325	3	9	0	0
18	76 pieces Corahs ... per piece	1.250	95	0	0	0
		£	178	2	0	0

It may be as well to observe, that it will not be necessary to have account books ruled with four columns. Two columns will answer the same purpose, one for the pounds, and another for the mils; or to save the expense of new books, three columns can be used, as at present; they will then be pounds, florins, and mils.

F. C. M.
EXAMPLE 1.—26 yds. Satin, at .2 2 4 per yd.

```
 .224
   26
 ----
 1344
 448
 ----
5.824
```

£ F. C. M.
Ans. 5 .8 2 4.

£ F. C. M.
EXAMPLE 2.—34½ yds. Cloth, at 1 .0 5 0 per yd.

```
 1.050
    34½
 ------
   4200
  3150
    525
 ------
 36.225
```

£ F. C. M.
Ans. 36 .2 2 5.

F. C. M.
Example 3.—63 yds. Cloth, at .3 2 2 per yd.

.322
63
966
1932
20.286

£ F. C. M.
Ans. 20 .2 8 6.

F. C. M.
Example 4.—44¾ yds. Cloth, at .2 5 0 per yd.

.250
44¾
1000
1000
125
625
11.1875

£ F. C. M.
Ans. 11 .1 8 7

£ F. C. M.
Example 5—Discount on 73 .5 2 2, at 2½ p. cent.

73.522
2½ per cent.
147044
36761
1.83805

£ F. C. M.
Ans. 1 .8 3 8

In dividing by 100, it is usual in the ordinary way, to cut off two figures toward the right. The same result is obtained in decimals, by moving the decimal point two places toward the left, as will be seen by the preceding example.

F. C. M.
Ex. 6.—4cwt. 3qrs. 14lbs. of Tea, at .2 2 5 per lb.

```
cwt. qr. lb.
  4   3   14
  4
 ----
  19
  28
 ----
 166
 38
 ----
 546 at .2 2 5
.225
------
  2730
 1092
1092
-------
122.850
```

£ F. C. M.
Ans. 122 .8 5 0

£ F. C M.
Ex. 7.—6cwt. 3qrs. 15lbs. Sugar. at 2 .2 5 0 p. cwt.

6cwt. 3qrs. 15lbs.
4
27
28
231
54
771 lbs.

112)2.250(.020089285
224
1000
896
1040
1008
320
224
.960
896
640
560
.80

F. C. M.
.0 2 0089285
771 lbs.
20089285
140624995
140624995
15.488838735

£ F. C. M.
Ans. 15 .4 8 8

In the above example, the division by 112 could have been carried further, if necessary, but as it could not alter the result, it would be useless. In fact, it has been carried needlessly far already; but it has been done, in this instance, to show the nicety to which a decimal fraction can be reduced.

£ F. C. M.
Ex. 8—Discount on 138 .3 3 8, at 1¼ per cent.

¼)138.338, at 1¼ per cent.
345845
1.729225

£ F. C. M.
Ans. 1. 7 2 9.

F. C. M.
Ex. 9.—16lbs. 13oz. 12drms. Mace, at .1 7 2 p. lb

drams
256).1720(.000671875
1536
1840
1792
480
256
2240
2048
1920
1792
1280
1280

lb. oz. dr.
16 13 12
16
109
16
269
16
1626
269

F. C. M.
4316 drams, at .0 0 0671875
4316
4031250
671875
2015625
2687500
2.899812500

£ F. C. M.
Ans. 2 .8 9 9

£ F. C. M.
Ex. 10.—15tns. 17cwt. 3qr. 13lb. at 3 .7 5 0 p. cwt.

112)3.750(.0334821
336
390
336
540
448
920
896
240
224
160
112
48

Tons. cwt. qr. lb.
15 17 3 13
20
317
4
1271
28
10181
2542

F. C. M.
35601 lbs., at .0 3 34821
35601
334821
20089260
1674105
1004463
1191.9962421

£ F. C. M.
Ans. 1191 .9 9 6

Ex. 11.—108lbs. 13oz. 15drams, at .056 per lb.

drams.
256).0560(.00021875
512
480
256
2240
2048
1920
1792
1280
1280

lbs. oz. drs.
108 13 15
16
661
108
1741
16
10461
1741

F. C. M.
27871 drams, at .0 0 021875
27871
21875
153125
175000
153125
43750
6.09678125

£ F. C. M.
Ans. 6 .0 9 6

£ F. C. M.
Ex. 12.—Discount on 1200 .9 9 1, at 3 per cent.

1200.991
3
———
36.02973

£ F. C M.
Ans. 36 .0 2 9

F. C. M.
Ex. 13.—3cwt. 1qr. 5lbs. at .0 2 5 per lb.

cwt. qr. lb.
3 1 5
4
———
13
28
———
109
26
———
369 lbs. at .025
.025
———
1845
738
———
9.225

£ F. C. M.
Ans. 9 .2 2 5

```
                                       F. C. M.
Ex. 14.—2cwt. 3qrs. 9lbs. at .0 2  5  5
                  cwt. qr. lb.
                     2   3   9
                     4
                  ----
                    11
                    28
                  ----
                    97
                   22
                  ----
                   317 lbs. at .0255
                 .0255
                  ----
                  1585
                 1585
                 634
                ------                      £  F. C. M.
                8.0835                 Ans. 8 .0 8 3


                                               F. C. M.
EXAMPLE 15.—3cwt. 2qrs. 10lbs. at .0 3  0 per lb.
                  cwt. qr.  lb.
                     3   2  10
                     4
                  ----
                    14
                    28
                  ----
                   122
                   28
                  ----
                   402 lbs. at .030
                  .030
                ------                      £  F. C. M.
                12.060                Ans. 12. 0 6 0.
```

£ F. C. M.
Ex. 16.—26 doz. Handkerchiefs, at 3 .0 5 0 p. doz.

3.050
26

18300
6100

79.300

£ F. C. M.
Ans. 79 .3 0 0

F. C. M.
Ex. 17.—12 doz. Collars, at .3 2 5 per doz.

.325
12

3.900

£ F. C. M.
Ans. 3 .9 0 0

£ F. C. M.
Ex. 18.—76 pieces Corahs, at 1 .2 5 0 per piece.

1.250
76

7500
8750

95.000

£
Ans. 95.000

SECTION VIII.

MISCELLANEOUS QUESTIONS.

Ques. 1.—A trader failing owes to A £1534 .7 F. 5 C. 0 M.; to B £1263 .6 F. 2 C. 5 M.; to C £426 .1 F. 2 C. 0 M. His assets amount to £546 .1 F. 4 C. 0 M. How much will each receive, and how much per pound?

```
                1534.750
                1263.625
                 426.120
                --------
Amount Debts    3224.495
Amount Assets    546.140
```

The amount of assets therefore is $\frac{546140}{3224495}$ of a pound.

```
3224495)5461400(.169372
        3224495
        --------
        22369050
        19346970
        --------
         30220800
         29020455
         --------
          12003450
           9673485
          --------
           23299650
           22571465
           --------
             7281850
             6448990
             -------
             .832860
```

A's debt 1534.750
.169372
3069500
10743250
4604250
13812750
9208500
1534750
259.943677000

B's debt 1263.625
.169372
2527250
8865375
3790875
11372625
7581750
1263625
214.022893500

C's debt 426.120
.169372
852240
2982840
1278360
3834080
2556720
426120
72.171796640

F. C. M.
Ans. .1 6 9372 in the pound.

	£	F.	C.	M.
A's dividend	259	.9	4	367
B's ditto	214	.0	2	289
C's ditto	72	.1	7	179
	546	.1	3	835
Assets	546	.1	4	0

£ F.
Ques. 2.—A merchant buys 550 .5 Consols, at $91\frac{3}{8}$, which he afterwards sells at $94\frac{1}{2}$; what does he gain?

$94\frac{1}{2}$
$91\frac{3}{8}$

$3\frac{1}{8}$=3.125 gain per cent.
550.5
3.125

27525
11010
5505
16515

17.203125

£ F. C. M.
Ans. 17 .2 0 3

£ F. C. M.
Ques. 3.—Required the amount of 126 .2 5 0, at 5 per cent. for 14 yrs., compound interest.

Compound int. on £1 for 14 yrs., at 5 per cent. } 1.979931
126.250

98896550
3959862
11879586
3959862
1979931

249.966188750

£ F. C. M.
Ans. 249. 9 6 6

In calculating compound interest, it will be found that the amount of any sum for any number of years, at any rate per cent., is equal to the amount of £1 for the same number of years, and at the same rate per cent. multiplied by the principal. This is exemplified in the preceding and following questions, and for reference and quick calculation of compound interest, we have subjoined a table of compound interest on £1 for 20 years, at 3, 3½, 4, and 5 per cent.

QUESTION 4.—Required the amount of £50 for 7 years, at 4 per cent. compound interest.

$$\left.\begin{array}{r}\text{Compound interest on £1}\\ \text{for 7 years, at 4 per cent.}\end{array}\right\}\begin{array}{r}1.315931\\ 50\\ \hline 65.796550\end{array}$$

£ F. C. M.
Ans. 65 .7 9 6.

QUESTION 5.—Required the amount of £156 for 20 years, at 3½ per cent. compound interest.

$$\left.\begin{array}{r}\text{Compound interest on £1}\\ \text{for 20 years, at 3½ pr.cent}\end{array}\right\}\begin{array}{r}1.989789\\ 156\\ \hline 11938734\\ 9948945\\ 1989789\\ \hline 310.407084\end{array}$$

£ F. C. M.
Ans. 310 .4 0 7

TABLE

Showing the amount of £1 for any number of years not exceeding 20, at 3, 3½, 4, and 5 per cent. compound intrest.

Yrs.	3 per cent.	3½ pr cent.	4 per cent.	5 per cent.
1	1.030000	1.035000	1.040000	1.050000
2	1.060900	1.071225	1.081600	1.102500
3	1.092727	1.108718	1.124864	1.157625
4	1.125508	1.147523	1.169858	1.215506
5	1.159274	1.187686	1.216652	1.276281
6	1.194052	1.229255	1.265319	1.340095
7	1.229873	1.272279	1.315931	1.407100
8	1.266769	1.316809	1.368569	1.477455
9	1.304773	1.362899	1.423311	1.551328
10	1.343915	1.410599	1.480244	1.628394
11	1.384233	1.459870	1.539454	1.710339
12	1.425760	1.511069	1.601032	1.795856
13	1.468534	1.563956	1.665073	1.885649
14	1.512589	1.618695	1.731676	1.979931
15	1.557967	1.675349	1.800943	2.078928
16	1.604706	1.733896	1.872981	2.182875
17	1.652847	1.794676	1.947900	2.292018
18	1.702433	1.857489	2.025816	2.406619
19	1.753506	1.922501	2.106849	2.526950
20	1.806111	1.989789	2.191123	2.653297

Question 6.—A trader has 5420 yards of prints, which cost him £220 3s. 9d. What is their cost in the new money?

```
   220   3   9          240)52845(220.1875
        20                  480
     -----                  ----
      4403                  .484
        12                   480
    ------                   ----
     52845                     450
    ------                     240
       240                     ----
                               2100
                               1920
                                ----
                               .1800
                                1680
                                ----
                                 1200
Or more simply       12)9.0      1200
                     ------
                     20)3.75
                     -------
                     220.1875
```

£ F. C. M.
Ans. 220 .1 8 7

Question 7.—Reduce 9¾d. of our present money to an equivalent in the new money?

```
 4)3.0
 -----
12)9.75
-------
20) .8125
---------
  .040625
```

F. C. M.
Ans. .0 4 0625

QUESTION 8.—Reduce £19 19s. 11¾d. of our present money to an equivalent in decimal money?

4)3.0
12)11.75
20)19.979166
19.9989583

£ F. C. M.
Ans. 19 .9 9 8958.

The above is a *mixed repeater*, and, consequently, a perfect equivalent cannot be obtained.